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FOREST FIRE CONTROL IN SOUTHERN CALIFORNIA

Report and Findings

OF A

SPECIAL SUBCOMMITTEE

OF THE

COMMITTEE ON

INTERIOR AND INSULAR AFFAIRS

HOUSE OF REPRESENTATIVES

EIGHTY-FIFTH CONGRESS

FIRST SESSION

ON

Hearings

HELD IN OCTOBER, 1957, PURSUANT TO

H. Res. 94

(85th Congress)

AUTHORIZING THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS TO MAKE INVESTIGATIONS INTO ANY MATTER WITHIN ITS JURISDICTION, AND FOR OTHER PURPOSES

APRIL 1958

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STATEMENT OF THE CHAIRMAN

APRIL, 1958.

To the Members of the House Interior and Insular Affairs Committee:

On October 8 and 9, 1957, I chairmaned a special subcommittee which held hearings in Los Angeles on forest fire problems in southern California. Other members of the special subcommittee were Messrs. Haley, Saylor, Shuford, Hosmer, Sisk, Rhodes, and Udall. These hearings are printed as Serial No. 14 and copies have previously been furnished to you.

There are set out herein the subcommittee's findings and recommendations. They are summarized on pages 2–6 with the remainder of the report being devoted to a more detailed discussion of the various problems. Although all of the subcommittee's recommendations call for action by the executive branch, primarily by the Forest Service, most of them involve the appropriation of additional funds and to this extent require congressional approval.

The subcommittee's findings might be summarized by the one statement that forest fire problems in southern California are more acute than in any other part of the country and require special consideration. Briefly, the subcommittee found a need in southern California (1) for more funds for a year-round program, (2) for more preventive measures, (3) for improved employment conditions, (4) for protection of forest and brush cover, (5) for newer and improved equipment, (6) for exclusion of heavy residential concentration from national forests, (7) for more consideration to emergency treatments of denuded watersheds and (8) for more active use of the Armed Forces on national forests.

I believe you will find the subcommittee's report an informative and valuable document. I am furnishing the subcommittee's findings and recommendations to the Department of Agriculture, the United States Forest Service and to other Federal, State, and local agencies for their consideration and such action as is warranted. I am also furnishing the subcommittee's findings and recommendations to the House and Senate Appropriations Committees for their consideration in connection with the appropriation of funds for the operations of the United States Forest Service.

CLAIR ENGLE,
Chairman, Interior and Insular Affairs Committee.

FOREST-FIRE CONTROL IN SOUTHERN CALIFORNIA

NEED FOR THE HEARING

The loss of 11 men on the night of November 25, 1956, while fighting fire on the Cleveland National Forest climaxed several years of unusual fire hazard and heavy life and property losses in southern California. During the 5-year period from 1951 through 1956, the 4 national forests located in this region had 1,505 fires. An average of 225 acres was burned by each fire compared with 31 acres for all fires on the national forests of California and 19 acres for those on the national forests of the entire country.

The shock of this unhappy event recalled to the public that for more than 50 years the Federal Government has assumed a major portion of the responsibility for protecting the publicly owned lands from fire and for their management. It has also cooperated with State and county agencies for the protection of non-Federal lands from fire. Yet the fires persist and with increasing realization of community dependence upon the brush-covered mountainsides for a continuous supply of pure water, the millions of American citizens in the region are aware that no problem is more vital to their future than control of fire.

Chairman Clair Engle of the House Committee on Interior and Insular Affairs viewed the problem as one of the committee's responsibilities, and in mid-December 1956 announced his intention of appointing a special subcommittee to hold hearings in the area at the earliest possible date. A new Congress started early in January 1957 and thereafter it was difficult to find a time when members of the committee could leave their duties in Washington and go into the area. The first opportunity came only after the close of the 1st session of the 85th Congress, and the announcement was made on August 31, 1957.

In opening the hearing in Los Angeles on the morning of October 8, 1957, the chairman said:

> I have called this hearing to learn why southern California is plagued by so many fires and why many of them get to be so large. While coming in from Blythe by air we noticed vast areas which have been burned over to the east of Los Angeles. One fire, I understand, cost a million dollars to control.
>
> I want to be able to assure the people in this area that every possible means is being used to keep forest and brush fires from starting and destroying so much of your valuable local watersheds. Of course, people have moved right out into these forest areas, and when these forest fires start not only the forest resources but the homes and even communities are menaced.
>
> This is not an investigation of the Forest Service, but with information gathered here, the committee hopes to determine whether new legislation is needed and in what form. If needed, it will be formulated and submitted for consideration by the Congress. If the desired improvement can be secured without legislation, the Forest Service will be advised of suggested changes in its regulations, procedures, and associated programs.

ATTENDANCE AT THE HEARING

The hearing to consider administration of forest fire prevention and suppression in southern California was held in Los Angeles on October 8 and 9, 1957. The membership of the special subcommittee which met there and considered the testimony was as follows:

Representative Clair Engle, California, Chairman.
Representative James A. Haley, Florida.
Representative George A. Shuford, North Carolina.
Representative B. F. Sisk, California.
Representative Stewart L. Udall, California.
Representative John P. Saylor, Pennsylvania.
Representative Craig Hosmer, California.
Representative John J. Rhodes, Arizona.

Sidney L. McFarland, engineering consultant for the Committee on Interior and Insular Affairs, participated in the hearings and Harris Collingwood, who, until his recent death, was Chief of the Subdivision of Natural Resorrces, Legislative Reference Service, Library of Congress, served as forestry consultant to the committee.

Regional Forester Charles A. Connaughton, in charge of the California region of the United States Forest Service, Director DeWitt Nelson of the California Department of Natural Resources, California State Forester F. H. Raymond, Los Angeles County Forester Keith E. Klinger, Col. H. E. Hedger, chief engineer, Los Angeles County Flood Control District, Chairman Robert T. Radford of the Los Angeles County Watershed Commission, Chairman W. B. Carter of the Watershed Fire Council of Southern California, and Professor Emeritus A. W. Sampson of the School of Forestry, University of California, were among 32 witnesses who personally presented testimony to the subcommittee. In addition, written testimony submitted by nine others is included in the hearing record and was considered during preparation of the report.

FINDINGS AND RECOMMENDATIONS

1. More funds and yearlong programs needed for southern California

Finding.—Costs of preventing and suppressing fires on the national forests in southern California are higher than elsewhere, largely because of local weather, soil, and geographic conditions. The problem had been presented repeatedly to the Bureau of the Budget and the appropriations committees of the Congress, but year after year emergency funds have been required to supplement inadequate regular appropriations allotted for their protection. Use of emergency funds requires declaration of a state of emergency following exhaustion of regularly appropriated funds. Frequently, before the funds are available, neighboring State and local fire-fighting agencies have made the initial attack before the Federal forces move in. Their combined efforts have held down damage to the national forest watersheds but costs in dollars and acres were greater than would have been necessary had a full Forest Service organization been available. Repetition of the too small regular appropriations has caused the Forest Service to lose leadership and prestige.

Recommendation.—The subcommittee recommends that the administration consider the advantages of a plan to earmark approximately $2,375,000 to the 4 national forests in southern California, in addition to the annual appropriation for national forest fire prevention and suppression. This amount, to be appropriated annually for 10 years has been recommended by the Southern California Watershed Fire Council.

2. Need for more preventative measures preparatory to fire suppression

Finding.—The Forest Service has inaugurated a construction program with plans and maps, after the manner of a military campaign, preparatory to more rapid and effective forest fire attack anywhere on the four national forests and their environs in southern California. The access roads, tractor trails, firebreaks, cleared zones for the safety of men and equipment, helicopter ports and helispots, cisterns and other water replenishment stations, and permanent metal markers along the roads contemplated in the program, together with supporting plans and maps are less than half completed. This "preplanning for fire suppression" shows a new spirit of adventure and imagination that promises to reduce the number and size of watershed burns, the cost of fighting fires, and the threat to life and property.

Recommendation.—The subcommittee recommends that the administration request appropriation of sufficient funds to national forest fire prevention and suppression for early completion of maps, plans, and construction on each national forest in southern California.

3. Conditions of employment need to be improved

Finding.—Competent key personnel in forest fire prevention and suppression, including crew foremen, tank truck operators, fire managers and prevention workers need to be employed in larger numbers and for yearlong periods. Wages and salaries, plans for promotion and pay increases, tenure of employment, provision for overtime, living quarters and opportunities for men in these categories to make a career with the national forest fire-fighting forces are generally below those offered comparable trained men by other fire-fighting agencies and by private industry. Their employment with the Forest Service too frequently is a training period rather than a career. Many seek more satisfactory employment with other agencies. The rapid turnover among Forest Service fire prevention forces holds down the number with training and intimate knowledge of the locality, forces dependence upon short-term employees, and discourages many who would make a career of forest fire prevention and suppression in the Forest Service.

Recommendation.—The subcommittee recommends that the administration direct the Forest Service to expedite its study of job classifications and salary schedules, hours, tenure of employment, and housing available to key employees in national forest fire prevention and suppression, to the end that levels of payment, prospects for advancement and recognition, and housing facilities may be comparable with those provided for similar work, by other public agencies and by private industry in southern California.

4. Forest and brush cover needs complete protection

Finding.—Nowhere in America is brush and chaparral watershed cover so vital to community life as in southern California. Nowhere is the vegetal cover so flammable and fire control so hazardous.

Nowhere have losses of life and property of those who occupy the lower slopes and valleys been so quickly associated with watershed denudation.

(*a*) The natural brush and chaparral cover with its accumulation of debris protects the steep mountains from erosion, reduces most sources of flood, and lessens damage to downstream structures.

(*b*) When this cover is ignited the speed and intensity of fire spread may be comparable to an explosion. When it stands, an ever-present fuel hazard, suggestions are made that the brush be burned by intention and under control, rather than to leave the community open to repeated disaster from accidental fires.

(*c*) Experience proves, however, that even when fire is directed to a specific soil, terrain, vegetative cover and weather condition, the potential dangers demand restriction to the clearing of firebreaks and to emergency backfires during conflagrations.

Recommendation.—The subcommittee recommends that the Forest Service intensify its present program for complete fire prevention and control in southern California. At the same time it recommends that this program be supplemented with more research to reduce existing fuel hazards with fire-retarding chemicals, establishment of slow-burning plants, controlled burning of brush, or any other means that will accomplish that end while protecting the soil mantle.

5. Newer types of equipment are needed and experimentation with new tools, plant materials and techniques must be continued

Finding.—The subcommittee finds that techniques of fire prevention and control in forest and brush cover have been greatly improved, that reductions have been made in the elapsed time from report of a fire to arrival of the attacking forces, and that progress has been made in securing slow-burning and fire-retarding plant materials from other parts of the world, some of which may prove suitable as replacements for the highly flammable brush and weeds growing on the more hazardous portions of southern California watersheds.

The subcommittee is impressed with the dramatic results of Operation Firestop, and especially such newly designed tools as helicopters, air tankers and chemical units equipped for rapid air and land attack with water, chemicals or mechanical means. It is also impressed with the conclusion of those who studied Operation Firestop, that future forest research programs must assume greater responsibility than they have in the past for keeping the forest administrative and protective officers abreast with modern technological and scientific developments.

The subcommittee sees great promise in recent action by the State of California in supporting a program of forest research to be conducted in cooperation with the United States Forest Service, with annual appropriations of $50,000.

Recommendation.—The subcommittee recommends that the administration study the forest fire research program as now being conducted under the Forest Research Act of 1928 (45 Stat. 699), with two objectives:

(1) To more quickly translate modern technological and scientific developments in terms of fire prevention and suppression. Consideration may well be given to projects designed to get workable information on forest fire behavior, meteorological influences upon fire, design of effective land and airborne

equipment for more rapid attack, chemicals capable of retarding or extinguishing fire, the effect of such chemicals upon soils and plant growth, chemicals or hormones capable of slowing plant growth and thereby reducing the fire hazard annually, accumulated fuels, plants with slow-burning or fire-resistant characteristics which can be used as replacements for highly flammable brush and weeds now growing on the more hazardous portions of southern California watersheds;

(2) To develop a cooperative forest fire research program for southern California with an annual appropriation of $350,000 from the Federal Treasury which will be available in amounts comparable with funds provided according to mutual agreement by the State of California, the several counties, and groups of citizens or industries.

6. Areas of heavy residential concentration need to be excluded from within the national forests

Finding.—The subcommittee finds many yearlong as well as seasonal residences within and abutting the boundaries of national forests. Their presence adds risks and confusion to the prevention and suppression of forest and brush fires, increases hazards to life and property, multiplies costs of administration, detracts from appropriate national forest functions, and jeopardizes the record of responsive cooperation by State, county, municipal, and citizen fire-fighting forces to fires regardless of their relation to national forest boundaries.

Recommendation.—The subcommittee recommends that the Forest Service expedite current studies of national forest boundaries with a view toward excluding areas in the vicinity of the boundary which can be used for home developments without jeopardizing adjacent high watershed values. This study should consider the exchange of the excluded lands for other lands within national forest boundaries, and appropriate State, municipal, or county protection of the excluded lands.

The subcommittee also recommends that the Forest Service work with local government agencies toward ultimate exclusion of homes used seasonally through appropriate zoning ordinances where the fire risk to watershed values is great.

7. More liberal authorization needed for postfire emergency treatments on denuded watersheds

Finding.—The subcommittee finds that funds authorized under section 216 of the Flood Control Act of 1950 (64 Stat. 184; 33 U. S. C. 701b–1), have been so effectively used for emergency treatment of denuded watersheds as to suggest their application to a larger number of denuded areas and for the application of more durable forms of watershed protection. The subcommittee finds, also, that cooperation provided by interested local agencies is contributing valuable permanent control measures on denuded watersheds.

(*a*) The immediate problem following a major fire is to get vegetative cover on the ground. Without it flood and erosion hazards multiply many times. The Flood Control Act of 1950 authorizes the Secretary of Agriculture to spend $300,000 a year for emergency measures to retard runoff and prevent soil erosion on any watershed regardless of ownership, provided the work is justified by threatened

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losses of life and damage to property. These are the hazards, rather than losses of topsoil or soil mantle, which justify expenditure of the funds. Treatments made under authority of the Flood Control Act of 1950 are restricted to those of an emergency nature.

(*b*) Where site conditions permit emergency treatment needs to be followed up with the planting of effective permanent vegetation of relatively low flammability.

(*c*) State and local agencies are commended for their vigorous participation in the emergency treatment projects.

Recommendation.—The subcommittee recommends that the Forest Service review the provisions and authority contained in section 216 of the Flood Control Act of 1950 as they relate to emergency treatment of denuded watersheds to determine the advisability (1) of expanding this authority to reduce hazards to life and property on a larger number of denuded areas, (2) of introducing long-lived plant materials of relatively low flammability to give more permanent protection against soil losses from erosion and excessive runoff, and (3) of encouraging more participation by State and local agencies to assure early restoration of all recently denuded watersheds with stands of permanent vegetative cover.

8. Need for more active use of Armed Forces trainees on national forests

Finding.—Wildlands in some national forests are being used by the armed services as places for training engineers and operators in the use of heavy mechanized equipment such as dozers and other earth-moving equipment. Roads, firebreaks, and other improvements constructed by trainees frequently prove as effective for national-forest protection and development as similar works constructed with regularly appropriated funds.

Recommendation.—The subcommittee recommends that the Forest Service confer with the Department of Defense and civil-defense agencies to consider integrating their training programs with Forest Service programs for fire prevention and suppression, so that trainees and their equipment can be used to build roads and firebreaks, improve sources of water supply, and do other jobs which will help in preventing and fighting fires.

DISCUSSION

1. More funds and yearlong programs needed for southern California.

Testimony submitted by representatives of responsible Federal, State, and county agencies impressed the subcommittee with the unusual fire hazards to which the forest- and brush-covered watersheds of southern California are subject. Also apparent was the need to finance the Federal prevention and suppression forces with regular annual appropriations comparable to those recently provided the present makeshift program by supplementing regular appropriations with emergency funds.

(*a*) The forest fire season in southern California is year long. Rainfall amounts to little or nothing during 8 months and that which occurs during the other 4 months is frequently dissipated by desert winds of low humidity and high velocity. The national forests are normally manned for fire control from about May 15 to November 15. An extended fire season such as occurred in southern California during the winter of 1956–57 required more emergency funds than regular funds to carry protection and suppression forces beyond the normal period.

On this problem, Congressman Saylor expressed the thought that perhaps the Forest Service was trying to apply an overall policy to the southern California forests, overlooking the fact that a special situation existed requiring special attention and regulations.

Of the long dry season typical of this region the regional forester testified:

> In recent years, two factors have combined to make what is typically the most difficult fire-control job in the country even more difficult. These are (1) severe fire weather, and (2) increased use.
>
> Southern California is in the midst of a continuing drought. Precipitation, humidity, and soil moisture are below average. Temperatures and wind velocities have been high. The drought has been continuing since 1945. With each succeeding year the flammability of the brush cover rises. The rapid spread of recent large fires is directly traceable to the accumulated effects of a long and continuing severe drought.
>
> The main factors affecting the start and spread of fire, such as wind, temperature, fuel moisture, and humidity are combined into a scientifically designed fire-danger rating system. Each day the fire danger is measured. Measurements for 1956 clearly indicate that the potential for more and larger fires was greater than for any season in the past 15 years. The bad burning conditions started earlier, stayed consistently high, and lasted longer than normal. Fire danger in southern California is such that major fires can and have occurred in every month of the year.[1]

Testimony indicating the yearlong hazards was added by K. E. Klinger, Los Angeles county forester and fire warden:

> Many areas throughout the Nation do have a limited fire season for forest, watershed, and rangeland fires. This is not true in southern California. Here we have a climate situation resulting in a yearlong fire season. Eight months of the year there is either no or very little rainfall. Frequently in the other 4 months dry desert winds of high velocity and very low humidity occur during which periods watershed fires start. These fires will burn unless promptly suppressed by organized fire-protection agencies. A number of the most disastrous watershed fires in southern California and specifically in Los Angeles County, including Angeles National Forest, have started and burned thousands of acres of extremely valuable watersheds in December and January.[2]
>
> * * * * * * *
>
> In southern California, the United States Forest Service is financed for the so-called fire season on a 6- to 8-month basis for the larger fire-protection force. After a fire starts they can spend emergency funds—often too late. This does not include yearlong administrative personnel.
>
> As a result, fires occurring after the seasonal fire force is laid off or materially reduced must be handled by a skeletonized Federal organization which in the main is not financed or organized to handle the fires. The results are that these too numerous fires inside the Angeles National Forest must be attacked by the yearlong fire-fighting forces of the Los Angeles County Fire Department, and in some cases incorporated cities such as the city of Los Angeles. Similar situations prevail throughout the other national forests in southern California.[3]

[1] Hearings before a Special Subcommittee on Interior and Insular Affairs, House of Representatives, 85th Cong., 1st sess., on "Matters Relative to the Control of Forest and Brush Fires in Southern California" (Committee Serial No. 14), p. 17.

[2] Ibid, p. 46.

[3] Ibid., p. 47.

Alarms inside Angeles National Forest to which the Los Angeles County Fire Department responded, 5-year period [1]

	1952–53	1953–54	1954–55	1955–56	1956–57	5-year total
FIRE SEASON						
July	4	13	13	10	11	51
August	4	8	13	8	9	42
September	7	3	6	4	11	31
October	1	4	5	5	3	18
November		3	3	1	5	12
4 MONTHS OFF SEASON						
December	3	5	5	5	7	25
January		1	1	8	6	16
February	6	2	5	4	3	20
March	1	3	2	1	2	9
Subtotal	10	11	13	18	18	70
FIRE SEASON						
April	1	1	6	2	2	12
May	1	6	6	3	7	23
June	3	5	2	8	11	29
Total	31	54	67	59	77	288

[1] Ibid, p. 47.

State Forester Raymond pointed this up with a statement that approximately 35 percent of the annual loss in southern California occurs during the fall and winter, from October to January, as contrasted with approximately 10 percent loss during the same period in the north. "This loss," he added in support of earlier statements by Regional Forester Connaughton, "is due to the extreme dry periods, and particularly to the Santa Ana winds which are characteristic of this area." [4]

(*b*) The need for more funds to maintain yearlong protection in southern California was revealed in the following colloquy between the Regional Forester and Chairman Engle:

What are the mechanical difficulties, Mr. Connaughton, so far as the Forest Service is concerned administratively, in arranging an all-year fire-fighting organization in southern California where we have this unique problem of fire control?

Mr. Connaughton replied:

The Forest Service has a very definite limit of funds available in terms of its organization. With the available funds, we place that on what amounts to a seasonable basis. And when the funds run out we have an emergency authorization to carry us over and beyond the seasonal period, assuming the rains have not yet come.

That is just a makeshift arrangement, in that there is no continuity guaranteed to the personnel that are employed. If the emergency is still continuing at the close of the regular season or the close of the financial period, they can be continued. But they have no assurance when they start that they are going to run

[4] Ibid., p. 23.

on through. And so, for that matter, from that standpoint, we are on a hand-to-mouth basis at the close of our regular financial period, which is not adequate to extend through the year in a situation such as this, and, as you have indicated, is quite different from what we face where we run from snow to drought and back and forth again.[5]

The appropriation for fiscal year 1957 included $2.3 million for forest fire suppression in southern California. The year proved so bad, however, that emergency allotments of $3,077,008 were added to the budget to bring regular and emergency expenditures for forest fire suppression to a total of nearly $5.4 million.

(*c*) The regional forester testified [6] that the 4 southern California national forests represent only 2 percent of the nationwide area protected by the Forest Service, but in fiscal year 1957 roughly 25 percent of the total fire control funds available to the Forest Service was used for their protection. The average national expenditure per protected acre was 10 cents. For all national forests in California it was 41 cents, but for the 4 national forests in southern California it was $1.30 per acre.

Unit	Fire-control funds expended fiscal year 1957		Area protected		Funds per protected acre
	Amount	Percent	Acres	Percent	
	Millions		*Millions*		
All national forests and associated lands	[1] $20.7	100	199	100	$0.10
All California national forests	[1] 9.4	45	23	12	.41
4 southern California national forests	[1] 5.2	25	4	2	1.30

[1] Includes expenditures from following appropriations: (*a*) National forest protection and management; (*b*) forest fire fighting; and (*c*) flood prevention.

(*d*) Reciprocal arrangements between the Forest Service, California Division of Forestry, and the counties permit each to assume responsibility in accordance with their intermingled geographical and land-ownership patterns. Santa Barbara, Ventura, and Los Angeles Counties act as agents of the State forester to protect areas of State responsibility situated outside national forest boundaries and outside incorporated cities. In Orange, Riverside, San Bernardino, and San Diego Counties the State organization protects all wildland in intermingled ownership. Most of the land in each group lies below and outside national forest boundaries. The State legislature annually appropriates funds for these purposes to the State forester, and supplementary funds are provided by the county, municipal, and citizen agencies.

The following table, submitted by State Forester F. H. Raymond, shows the areas in the seven counties commonly referred to as southern California, for which the State of California is responsible:

[5] Ibid., p. 55.
[6] Ibid., p. 20, 21.

TABLE I.—*Statutory and contract protection acreages, California Division of Forestry*

	Statutory responsibility, State and private				Direct protection, statutory and contract responsibility			
	Zone I		Zone II, outside national forests	Total State responsibility	Zones I and II		Total	Zone III, rural
	Inside national forests	Outside national forests			State and privates [1]	Federal [2]		
Santa Barbara	72, 815	296, 960	251, 300	621, 075	(2)	(2)	(2)	(2)
Ventura	49, 043	240, 040	71, 760	360, 843	(2)	(2)	(2)	(2)
Los Angeles	42, 749	277, 505	204, 004	524, 258	(2)	(2)	(2)	(2)
Orange	14, 170	100, 400	69, 875	184, 445	170, 275	200	170, 475	221, 000
Riverside	106, 655	368, 360	98, 326	573, 341	467, 606	136, 083	603, 689	799, 000
San Bernardine	112, 564	102, 890	153, 298	368, 752	256, 218	71, 272	327, 490	588, 000
San Diego	134, 136	600, 274	237, 647	972, 059	837, 769	283, 420	1, 121, 189	425, 000
Total	532, 132			3, 604, 773				

[1] Excludes water, desert, and incorporated areas.
[2] Protected by countries through contract with the State.

(*e*) "I have here," testified State Forester Raymond, as indication of yearlong cooperation that far beyond the statutory and contract provisions—

an order which is just being issued from my office which will prepare for the moving into southern California from northern California of 25 fire trucks, 10 bulldozers, and 5 service units, with the foremen, drivers, and equipment operators it will take to make this equipment effective should we have such an outbreak as we have had in southern California in the past. We are calling this the Santa Ana task force, and we hope to prove 1 of 2 things: either we will put out the fires as soon as they start or else we might make it rain, 1 of the 2.[7]

During the discussion which followed, he added:

We are able to do this because the last session of the legislature appropriated funds which were to maintain on a year-round basis our foremen and truck drivers and equipment operators, who always in previous years before that, except for a certain few, had to be laid off in the fall of the year. We are now on a yearlong basis on those personnel, and we can move them from northern California to southern California; whereas previously, when the fire season ended in northern California, we had to lay them off.[8]

Director Nelson of the State department of natural resources added in support of his belief that yearlong employment of key personnel is fundamental:

It is because of the yearlong staffing of those key personnel with the State division of forestry that he has those men that he can move into this critical area at this time.

It would certainly be helpful if Mr. Connaughton and his organization could do likewise when the critical period in the north is over, if he could move some of that personnel, if he had them, after the calendar fire season, into the south to strengthen all of our forces during this critical period.[9]

Thereafter the following colloquy took place between Representative Shuford and Regional Forester Connaughton:

Mr. SHUFORD. Mr. Connaughton, do you have that authority now to bring them down from the north so you could use them in the south?

[7] Ibid., p. 23.
[8] Ibid., p. 69.
[9] Ibid., p. 68.

Mr. CONNAUGHTON. Yes, sir.

Mr. SHUFORD. Would not that help your manpower situation some?

Mr. CONNAUGHTON. Yes, sir; to some degree. However, the real basic thing—although I am in full agreement with the program as outlined, their base organization is still here, and this is just a group on top. Our base organization is still inadequate in terms of our comparative needs, but this other could be worked out.

Mr. SHUFORD. You do have the right to move those extra men down to augment your force here?

Mr. CONNAUGHTON. Yes; we have.

Mr. SHUFORD. But you still think your base organization is not sufficient?

Mr. CONNAUGHTON. Yes.[10]

Pursuing this matter a little further Mr. Shuford stated:

I think it boils down to this, as far as I can see, that the main trouble in fighting fires here is that the Forest Service has not been getting sufficient money to carry on this very necessary work in this State.

Like our chairman, Mr. Engle, I think that some study should be made, and some report should be given to the Congress to justify an additional allowance for this work so that you can cooperate with the other gentlemen in fighting the fires in this area.[11]

Budget restrictions require declaration of a state of emergency before the Forest Service can undertake deployment of national forest manpower and equipment from other national forests in southern California and from neighboring States, comparable to the State's Santa Ana task force.

(*f*) In 1954 the Watershed Fire Council of Southern California requested the 84th Congress for $2,375,000 per year over and above regular appropriations provided for fire protection in southern California during fiscal year 1954, for 10 years to provide sufficient numbers of yearlong fire-fighting crews and other personnel, the purchase of new and badly needed fire-fighting equipment, building of fire trails and breaks, construction of additional fire crew camps, water stations, and other structures, building of heliports, and putting into effect preplanning programs and other projects of a fire-prevention and presuppression nature.

"The Watershed Fire Council of Southern California," as defined by its chairman, W. B. Carter[12]—

is a citizens' organization made up of representation from areas representing the four southern California national forests—the Cleveland by the San Diego study group; Orange, San Bernardino, and Riverside Counties by the tricounty group representing the San Bernardino National Forest; the Watershed Commission of Los Angeles County representing the Angeles National Forest; the Ventura, Santa Barbara, and San Luis Obispo Counties representing the area of the Los Padres National Forest.

* * * * * * *

A program to provide adequate standards of fire protection for southern California national forests has already been developed. This program reflects actual needs of the United States Forest Service. It was prepared at the request of, and has been fully adopted by, the Watershed Fire Council of Southern California and its member groups.

It calls for the expenditure of $2,375,000 per year over and above regular appropriations provided for fire protection in southern California during fiscal year 1954, for 10 years, to provide sufficient numbers of yearlong fire-fighting crews and other personnel, the purchase of new and badly needed fire-fighting equipment, building of fire trails and breaks, construction of additional fire-crew camps, water stations and other structures, building of heliports, and putting into effect preplanning programs, and other projects of a fire-prevention and presuppression nature.

[10] Ibid., p. 69.
[11] Ibid., p. 68.
[12] Ibid., p. 143.

Adequate protection for the national forests of southern California, a 10-year program—Funds required annually, in addition to fiscal year 1954 appropriations, for adequate protection of national forest land

	Operation and maintenance	Capital investment	Total
Angeles	$515,000	$195,000	$710,000
Cleveland	210,000	102,000	312,000
Los Padres	495,000	325,000	820,000
San Bernardino	348,000	185,000	533,000
Total	1,568,000	807,000	2,375,000

The above dollar estimates for operation will employ, train, equip, and house 750 vitally needed additional firemen, and those for capital investment will permit the construction of the firebreaks, roads, trails, water developments, and heliports vitally needed to enable the increased forces to operate effectively to provide adequate protection.[13]

Francis C. Greer, appearing for the San Luis Obispo County Board of Supervisors testified that the plan calling for $2,375,000 annually for 10 years had been approved by the Forest Service, with an exception to permit payments to the Los Padres National Forest for 20 years.[14]

Arthur W. Walker, consultant to the State senate interim committee on forest practices, testified:

Last year Congress appropriated $900,000 to help meet this need in southern California. An additional amount of $1,475,000 is still needed annually to meet the needs of adequate forest fire protection as presented.[15]

(*g*) In earlier questioning of the regional forester, Chairman Engle asked—

whether or not there is anything here in the way of a general program to demonstrate that if the work is done ahead of time the fire fighting will not have to occur later. That is the basis, it seems to me, upon which it will be possible to convince the Appropriations Committee and the Congress itself that if the permanent, stable organization in the Forest Service were sufficiently increased we would not have to spend so much money fighting fires.

Mr. Connaughton's reply is summarized in the following paragraph:

As I indicated earlier, there can be no guaranty, obviously, that if more regular funds are spent you will reduce the emergency funds so much. But from all of the standpoints of logical judgment, based on the technical skills available, both in the Federal Forest Service, State, and county, the facts would indicate—and the action has been taken by the State and county in that direction—that adequate expenditures in the preplanning period will reduce the control aspects once a fire starts.[16]

2. Need for more preventive measures preparatory to fire suppression

Roads, firebreaks, safety zones, heliports and other capital improvements, with maps and plans preparatory to their construction from a "battle plan" which is basic to Forest Service goals for reduction of fires in the national forests of southern California. Early achievement of the "battle plan" is vital to water conservation and to the welfare of southern California.

(*a*) Ninety-nine percent of all fire outbreaks on national forests are quickly controlled. Total inaccessibility of the forest terrain is usually

[13] Ibid., p. 147.
[14] Ibid., p. 118.
[15] Ibid., p. 182.
[16] Ibid., p. 59.

the reason for the 1 percent that gets out of control. In the belief that the number of escaped fires must be further reduced, the Forest Service has announced 3 goals; first, that no fire shall exceed 2,000 acres in area; second, that the total burn on the 4 national forests in southern California shall not exceed 5,600 acres; and third, that no more than half an hour shall elapse between the first report of a fire and arrival of the attacking force. Accessibility is the key to each of these fire-fighting goals, for unless a fire can be reached and conquered quickly, no fire-fighting organization can control it.

The regional forester testified as follows concerning the few fires that get out of bounds:

> The history of fire occurrence on the national forests in southern California is indicative of the difficulty of the situation. These 4 national forests with an area of 2.8 million acres are located in 7 counties. In the 6-year period 1951–56, they had 1,505 fires. Each of these had disaster potential. Ninety-eight percent of them were held to less than 1,000 acres. About 1.5 percent burned between 1,000 and 10,000 acres, and less than 1 percent (only 10 fires), burned over 10,000 acres each. Although I think this is a good record, we are far from satisfied with it. Nowhere else in the United States do we have so many large fires on the national forests.
>
> Another indication of the southern California fire problem is that there the average-size fire on national-forest land in 1956 was 227 acres. This contrasts with 31 acres on all national forests in California and 19 acres for all national forests in the country. It has been possible to reduce the average size of fires in the last decade about one-third for all national forests, but in southern California there is no significant trend toward reduced average size.
>
> In the latter part of 1956, there were four very large forest fires in southern California. In the aggregate, they burned about 100,000 acres. They were on 2 national forests and in parts of 4 counties. Of these only the Malibu fire was not on national forest land. The State, county, and Forest Service cooperated on these fires.[17]

In response to a question by the chairman as to the statistical effect of excluding from the southern California averages all fires more than 10,000 acres in area, the regional forester submitted the following statement:

> For the period 1951 to 1956 the average size of fire in the national forests of southern California excluding all fires larger than 10,000 acres was 77 acres. Including the fires more than 10,000 acres raises the average to 225 acres per fire.
>
> There appear to be several reasons why average size of fire is large in southern California compared to nationwide averages (average size of fire on national forests nationwide in 1956 was 19 acres). Of dominant importance is the fact that for the period under consideration there has been a continued drought with accompanying high hazard fire weather in southern California. These conditions have created a disproportionately greater opportunity for spread of fire in this locality as compared to the Nation at large. Second, the improvement in access by road construction in rough mountain areas designed to increase timber harvest in forested regions elsewhere has not occurred on the brush covered mountains of southern California. This means that speed of attack on fires and access to going fires has not increased as favorably as it may have elsewhere. Third, southern California inherently has all elements which result in large fires to an exaggerated degree, such as steep topography, highly flammable fuel, and long periods of extreme fire weather.[18]

(*b*) Some of the capital improvements needed to make rough mountain areas more accessible are enumerated in the following testimony of Chief Engineer H. E. Hedger of the Los Angeles County Flood Control District:

> Some of the additional capital improvements which might be financed to advantage in protecting forest areas would, it is believed, include: (1) a network of

[17] Ibid., p. 17.
[18] Ibid., p. 80.

heliports to facilitate making full use of the latest development in quick, aerial transportation, (2) improving ridge tops to facilitate full use of mechanical equipment for fire suppression, and (3) additional radio communication facilities, water-storage facilities, fire stations, fire-fighting equipment, and fire roads.

Allocation of funds for fire protection beyond that normally provided for forest management could, I believe, be fully justified in southern California. Improved fire protection will result in fewer major fires, and thus a substantial saving in fire suppression costs can be effected and adequate fire protection of southern California watersheds will contribute appreciably to the flood protection of life and property in this area and to the conservation of one of our most important resources—water.[19]

On the matter of the need for more preventive measures, Chairman Engle expressed these views:

I have always been of the belief that if there were enough work done ahead of time it would not be necessary to fight so many big fires on an emergency basis. We see the Forest Service charging up and down the State with fire trucks, bulldozers, helicopters, and these tankers. I will have to say, as I have said many times, that when they get into a fire fight they do a wonderful job ordinarily. Sometimes they goof one, like we all do, but generally they have shown a remarkable amount of aggressive spirit in the way the Forest Service has fought fires. I have been impressed with their smoke jumps as well as the use of tankers.

But it seems to me we ought to be able to limit the size of these fires. You cannot stop fires, but you might be able to keep them smaller.[20]

Representatives of several State and county agencies added support to the need for preventive measures preparatory to fire suppression, now underway by the Forest Service, with State and county cooperation. Arthur W. Walker, consultant to the State senate interim committee on forest practices testified in favor of:

* * * preplanning to the end that all areas are made approachable for the combating of fire. This should include access roads, convenient water-supply sources (areas should be blueprinted so that any fire-control officer could judge the proper approach to the fire, not only from the standpoint of accessibility but also for the protection of human life).[21]

Burton W. Bogardus, president of the Big Santa Anita Canyon Permittees' Association drew from his own near-tragic experience to show the need for access roads into the mountain areas:

At 10 o'clock on the night of December 27, 1953, I stood on the road to Chantry Flats and watched one of the most horrible fires in the history of Angeles destroy my canyon. Dozens of wonderful fire engines with their crews stood idle and impotent along the road as the holocaust roared unchecked, and I saw far below through the smoke my homesite surrounded by flames.[22]

Mr. Bogardus amplified this statement in the following colloquy:

In my particular canyon, the road to Chantry Flats goes high on the hillside along the edge of the canyon to a dead end at the public campground. The fire was burning over across the canyon and down the lower side of the same canyon. They were not anywhere near the flames. There were no means to get the equipment in.

I might add that there again it was wonderful cooperation of the various agencies, because those fire engines belonged to many different municipalities as well as the Forest Service. But nevertheless they were not able to get at the flames, and when the flames hit the road they simply had to move out.

The CHAIRMAN. Do you agree with Mr. Rogers, who testified this morning that in some of those areas you could not get an access road because the terrain is so steep it would roll a bulldozer end over end?

Mr. BOGARDUS. In many areas that is true, yes, sir. As far as the heavy equipment is concerned, it is very difficult to move it. That is why I feel so very

[19] Ibid., p. 54.
[20] Ibid., p. 56.
[21] Ibid., p. 182.
[22] Ibid., p. 207.

strongly that these small crews working on a year-round basis are much more effective than trying to get heavy equipment in after the fire has started.

The CHAIRMAN. I certainly agree with you about the necessity of preventive work of one kind or another.[23]

Francis C. Greer, speaking for the San Luis Obispo County Board of Supervisors submitted a telegram wholeheartedly endorsing the program of the Watershed Fire Council of Southern California and urging continued support of it through adequate appropriations as essential to the continued growth of this area. The telegram stated:

A substantial part of this district has been preplanned, including firebreaks, heliports, and helispots and so forth under the program. Additional moneys from local sources, including flood control and fish and game moneys, have also been used on cooperative projects to further the program. The level of protection is still below that desired, in spite of the efforts made to date by all concerned. Continued support of the program until its ultimate development is accomplished is most important.[24]

Carl N. Hewitt, of Summit, in the San Bernardino National Forest, testified that the prevention program which contemplates reservoirs for water storage on access roads, escape routes with wide firebreaks and large safety islands—

is not merely a brainstorm of any one individual, but was put in writing by no less an authority than our highly respected deputy State forester, James Mace, and his able assistant, Butch Skinner, as long ago as 1950, after several field trips, followed by a joint conference of all Federal, State, and local fire and forestry officials from San Diego to San Francisco. At this joint conference these plans, written up by Mr. Mace and Mr. Skinner, were carefully discussed and concurred in by all the "top brass" above mentioned.[25]

With respect to preventive measures, Congressman Rhodes expressed interest in the proposal of Mr. F. R. Jewett of the Watershed Fire Council of Southern California that United States servicemen be used for fire break and road construction in national forests.[26]

California State Forester F. H. Raymond accused the Federal Government of failing to carry its full share of responsibility for fire-control preplanning and pre-fire-control land treatment in southern California. His statement follows:

The California Board of Forestry is on record requesting the Federal Government to more adequately meet their responsibility on federally owned lands. Fire-control preplanning, pre-fire-control land treatment, adequate initial attack fire-suppression forces, and fire research are the objectives of the fire-control agencies in southern California. These include the United States Forest Service. The objectives can only be accomplished when there is an adequate appropriation of funds by the respective legislative bodies. The California State Legislature is meeting its responsibility; the boards of supervisors of the southern counties are meeting their responsibility; is it not true that Congress has a share in this responsibility? [27]

"If Congress could be convinced," remarked the chairman, "I think that the precontrol work would cut down the need for huge amounts of these emergency funds."

3. Conditions of employment need to be improved

Rigid wage and salary scales, limitations of hours and tenure of employment, and inadequate perquisites such as living quarters on the national forests, hamper the Forest Service in its efforts to enlist and maintain a well trained force large enough for effective prevention and suppression of forest fires in southern California.

The problem is not new, but it is aggravated in southern California because offers from other agencies that compete for similar services are so much more attractive than comparable offers by the Forest Service.

[23] Ibid., p. 207.
[24] Ibid., p. 118.
[25] Ibid., p. 249.
[26] Ibid., p. 195.
[27] Ibid., p. 25.

(*a*) The regional forester testified that the Forest Service presently has about 250 yearlong employees in southern California. All others are short-term or emergency employees. To bring the base organization to the numbers needed for effective protection of the national forests in southern California, no less than 1,390 employees would be required. Of these, 750, or 500 additional, should be on a yearlong basis.

On this matter of seasonal employment Chairman Engle stated:

It seems to me the Forest Service suffers from the fact you have a skeleton organization during one part of the year, and then you are dredging down into the jails and every place else to get fire fighters during other parts of the year, whereas, if the Forest Service had a larger permanent organization of trained people, they could do the things that prevent these fires from getting so big, and at the same time they would have a better chance, it seems to me, to retain the kind of expert personnel you need to do an effective job, not only of fire prevention but of fire control.

How do you hang on to those fellows, to your experts, when you have an on-and-off proposition? You have a very small force, do you not, about 4 months a year? [28]

In reply Mr. Connaughton said:

That is a very real problem. We do not hang onto them nearly as adequately as we should.

May I give you a couple of figures on the need for yearlong personnel on that, just to back up what you are saying.

We estimate right now there should be a total manning of 1,390 positions, of which 54 percent should be year long. In other words, 750 yearlong positions. That means almost 500 more than we have today. That is what we are faced with.

In other words, we bridge the gap with termporaries. On an emergency basis, we can extend employment but it is on a very indefinite arrangement wherein the employee has no assurance of how long he will be there and when he will be released, because when the emergency runs out, our emergency funds run out, and we must release our seasonal men. The point you make is very valid.[29]

(*b*) Working hours and tenure of employment, as well as salaries, for Forest Service fire-prevention and suppression forces were discussed from several points of view. Chief T. William Heidner of the Pasadena City Fire Department, said:

In the city's fire department a man usually does not come into the service with the idea of working for just a summer, for a year or two, and then going into something else. He comes in with the idea in mind of being permanent, and he wants to make that his livelihood. So he dedicates his service from the very beginning. Possibly that is one reason we have difficulty in securing the right type of man for the job in our service.

We have to be very careful in selection, and we spend a great deal of money in training these men. We just do not date lose them after we have trained them to become especially good fire fighters. For that reason probably our salaries or our working conditions are different, higher than for the Forest Service, working conditions and salaries. I do not think we could operate under the same circumstances that they do, or the same conditions. In fact, it was tried in 1928 and 1929, somewhere around there, when we tried hiring men for just a summer season to do nothing but fight brush fires. It was discontinued within 2 years because of the type of man that worked on that basis, he being not the type of man that gave a great deal of study to fire suppression.[30]

A similar theme was voiced by Earl Roberts, of the Citizens Forestry Study Group of San Diego County, when he told the subcommittee:

You would not consider in the city of Los Angeles, for example, hiring a fire department from 8 to 5. Yet you do that in many respects in the United States

[28] Ibid., p. 56.
[29] Ibid., p. 57.
[30] Ibid., pp. 140, 141.

Forest Service. I would like to know why, when you have a 12-month season, you cannot have a 12-month fire department.

I would like to put it back in your lap, you fellows who appropriate the money for these fire departments. Why do you shut these fellows off at 8 months? You know you cannot hire a good man to work for you in your business for 8 months out of the 12. Why do you think the Forest Service can do it? [31]

Speaking again to the same subject, Mr. Roberts said:

I have witnessed many, many instances and have many, many acquaintances who have been indoctrinated into the United States Forest Service. They serve a year or two, they get a little experience under their belt, and they are immediately pirated by one of these protection districts or other agencies of fire suppression, not the least of which is the United States Navy. We have the fire departments in every naval station in our area. The minute the Forest Service trains these young fellows and they have gotten a couple of years' experience so they can qualify to take a civil-service examination, they are pirated away by other agencies of Government, not only Federal Government but State government and fire districts.[32]

Arthur W. Walker, consultant to the State senate interim committee on forest practices recorded the following observation made recently in San Bernardino:

The supervisor of San Bernardino Forest was practically running an academy for the State forestry school in training men, because 10 of his keymen are taking examinations to go either to the city or State forest service. You cannot build up an efficient organization on that basis.[33]

Earlier, the chairman had remarked:

It seems to me, if I were a young fellow coming up in a fire-fighting organization, I would take a long look at the forest service, the outfit run here by State Forester Raymond and also Chief Klinger, as a possible career, and I would look them over pretty carefully.[34]

While not related in particular to the Inaja fire on the Cleveland National Forest in November 1956, the investigators appointed by the Chief Forester pointed out that—

present Government salary and wage rates make it difficult to obtain and hold competent fire-control personnel. Controlling mass forest fires is a difficult and highly technical job. The specifications for these positions should be further reviewed with appropriate Department and Civil Service Commission officials.[35]

Edward N. Munns, formerly in forest research administration, proposed that the Forest Service develop a professional forest fire control organization that—

would permit development and retention of a hard core of well-trained subprofessional men who could supervise fire-fighting crews with minimal instruction in emergencies.[36]

The regional forester's answers to questions from Representative Rhodes revealed that the Forest Service has little hope of placing its fire prevention and suppression forces under the wage board rather than under civil service. Mr. Connaughton held small hope for any attempt to shift between the wage board and civil service.

One encouraging aspect of this problem brought out by questions of Congressman Hosmer was the fact that the United States Forest Service, the State, and Los Angeles County work together in the training of personnel.[37]

To a question from the chairman concerning the adequacy of the so-called Johnson amendment (S. 1901, 85th Cong.), Merle Lowden of the Washington office of the Forest Service responded—

It would be helpful in this situation, but it would leave much yet to be done. In other words, it would not cure the situation we are talking about here.

[31] Ibid., p. 223.
[32] Ibid., p. 213.
[33] Ibid., p. 180.
[34] Ibid., p. 59.
[35] Ibid., p. 35.
[36] Ibid., p. 243.
[37] Ibid., p. 69.

Mr. Lowden told the subcommittee that the Forest Service now has studies underway to determine how to solve the problem and whether new legislation will be needed.[38]

(c) Support of such a study, to include salary schedules, living conditions, hours worked, and benefits for Forest Service personnel, was included as a major recommendation of the Watershed Fire Council of Southern California. The following comparison of salaries paid by the Forest Service and by Los Angeles County for four basic fire-control positions, was submitted as part of the evidence:

Position, title, and U. S. Forest Service grade—Forest Service title compared with similar county positions	Annual salary (beginning of grade)	
	Forest service—5-day week with standby on 6th and 7th days as fire danger requires	Los Angeles County—Work and standby 62 hours per week, each day counting 24 hours, requires more than 2 men to fill each position
Fireman, GS–2	[1] $3,404	$5,004
Tank truck operator, GS–3	[2] 3,969	5,668
Crew foreman:		
GS–4	[2] 4,269	6,192
GS–5	[2] 4,587	
Fire-control assistant to ranger:		
GS–6	[2] 5,100	5,496
GS–7	[2] 5,656	6,060

[1] Includes 15 percent differential.
[2] Includes 25 percent differential.

W. B. Carter submitted the council's statement and supported it with his own observations of wages and salaries paid by private industry in the Los Angeles area:

I have made some preliminary studies as to labor costs in relation to comparable figures of the Forest Service. The information that I gained here was from the department of employment. I will use Edwards, which is an Air Force installation close to where I live.

An unskilled warehouseman, untrained, get $2.11 an hour; and a laborer, unskilled, gets $1.94.

A fireman starting at Edwards is an S–4. He works a 60-hour regular pay week, but he puts in 72 hours. Therefore, he has an additional 12 hours' pay which he gets for his work. He has a shift differential, and his take-home pay is around $100 a week.

In order for a man in the Forest Service to get a comparable wage with that, he would have to be somewhere in a GS–7 or higher position which my knowledge on the GS series would indicate is in a pretty high bracket of income as far as the Forest Service is concerned.

The firemen at the North American Aviation plant where North American has their own firemen start at $1.81 to $2.11. This is just a fireman, not an engineer or skilled fireman. He works a 40-hour week, has time and a half for overtime, and shift differential. His take-home pay is around $100 a week.

The union scale in the area—and this is in the area of Angeles where we have competing people living and working on both sides where we can compare wages: we find the unskilled construction worker, union scale, $2.50 an hour; truckdrivers from $2.50 to $3.25 an hour.

Using the plant situation, we have the Pacific Coast Works: labor, $2.27 an hour. They work a 40-hour week. They have no skilled requirements when they start. They have company benefits and night pay extras and overtime.

California Portland Cement laborers, unskilled, start at $1.88; work a 40-hour week; have time and a half overtime.

[38] Ibid, p. 18.

The United States Rubber Co. who have a test base in the area, have drivers. Their salaries start at $380 a month with company benefits. Local drivers, that is merchandise deliveries, unskilled, their total pay is $350 to $375 a month.

Skilled workers in television repairing, radio, washers, things of that nature, go from $2.25 to $3 per hour as a general scale, depending upon their abilities.[39]

And again, speaking on the same subject:

I talked to a man in the Forest Service who was in charge of many thousands of dollars worth of equipment, and responsible for the lives and safety of his crew. He had the responsibility for protection and public relations with the citizenry, and he was getting less money than I pay our delivery man on an unskilled basis, and we have a fast turn over in that particular field.[40]

(*d*) Hand in hand with questions of wages, hours of work and tenure of employment, is the question of housing facilities provided for men on the national forests. Mr. Carter of the Watershed Fire Council told the subcommittee:

I think one of the important things, as we become acquainted with our people in the services, particularly in the low-scale field of the forestry service, we find a living condition where it is almost impossible for a young man to enter this field if he has any ambition as far as marriage is concerned, because so much of his time has to be spent in the camps. A young man certainly has very little incentive to acquaint himself with the service and join our Forest Service when he does not have the benefit of the chance of marriage and setting up a home, where he has to spend so much time in the Forest Service area.[41]

More to the point, however, is the Chief Forester's comment in response to a question submitted by former Forest Service employee Walter H. Jennsen, of Santa Barbara. The question follows:

Have you ever visited any of the smaller and poorly equipped stations like the station at Cranston, 6 miles from Hemet, Calif.? This station was condemned 25 years ago as unfit for living. Yet men are required to live in these houses and pay $25 a month rent. What man of pride of his job would consider living under such conditions, also being charged for his utilities, when they are furnished by the Government free of charge; also Vista Grande in the same district? [42]

The Chief Forester reveals some of the difficulties which confront Forest Service efforts to replace 40-year-old facilities with structures satisfactory to modern demands. His reply to this question follows:

The two ranger stations in question are old, having been built in 1918. They leave much to be desired. However, both have been maintained and are livable. Charges for them and utilities are made according to standard procedures. The Forest Service recognizes that housing conditions are not satisfactory and is engaged in a program to better them. It will, of course, require many years before all the unsatisfactory housing situations are corrected. The more urgent cases are necessarily given the highest priority under the current program.[43]

4. Forest and brush cover needs complete protection

Of all California problems confronting the Forest Service none is more controversial than the effort to prevent and suppress all fires on the national forests. Chairman Engle summed up the case at the opening of the hearing, as follows:

Many people claimed the prevention of all fire in the woods and chaparral builds up dangerous accumulations of brush and litter. Periods of long drought accompanied by high winds and low humidity occur so often in this region that they believe fire is inevitable. They believe that frequent small fires would be less dangerous than a few big ones. Almost to a man, they recommend some form of controlled burning to follow the first fall rains.

[39] Ibid., p. 145.
[40] Ibid., p. 145.
[41] Ibid., p. 145.
[42] Ibid., p. 236.
[43] Ibid., p. 237.

Many who wrote were equally vigorous in support of the present nonfire program of the Forest Service. They claim any fire ruins the soil's ability to conserve water, and declare that a permanent cover of trees, bursh, and grass is necessary to protect against erosion.[44]

Commenting on this problem after listening to testimony of the United States regional forester, the State forester and the chief engineer of the Los Angeles County Flood Control District, Congressman Saylor stated:

Mr. Chairman, I have listened very carefully to some of the questioning that has gone on here. I do not want to propose myself as an expert forester or expert fireman or expert flood-control man, but I have a little smattering of the whole bunch of them, that is, background of a little conservation, and I am concerned, and gravely concerned, with this burning business that is going on and is proposed. Because, unless your soil is different here in California than any other places I have ever found upon the face of the earth, once you build a fire and burn on top of it, you take something out of that soil. You are going to have happen to you o it here just what Mr. Hedger has pointed out: the first wind that comes along and blows it off, then comes the first rain, and along comes that sheet action, and away she goes, and you have absolutely nothing to hold it.

I think we are putting the cart before the horse, and until somebody has done some work, some agency of the State or Federal Government has done some work to determine what you are going to do with the vegetation and how you are going to replant it, we had better go awfully slow with a burning program.[45]

Also on this problem Congressman Hosmer brought out the need for stricter building ordinances as a forest fire preventive measure.[46]

Early clarification of Forest Service policy in respect to brush conversion and brush modification was made in the following statement by the regional forester:

On steep slopes with highly erodible soils, particularly where brush is the climax type, as is the usual case in southern California, broadcast burning should not be used to reduce fire hazard. Fire can be used in a limited way under careful control to prepare fire lanes. The Forest Service believes that improved fire control is the best policy under those conditions. Experience tells us that the danger of floods, accelerated erosion, mud and rock flows, is too great if the protective brush and other cover is removed. This hazard is accentuated in southern California by the concentrations of people and high property values immediately at the base of the mountains. There is no known practical way to establish and maintain a permanent grass cover on such areas.

Even on areas with gentler slopes and more stable soils, which are found mainly in northern California, the Forest Service does not favor indiscriminate burning. We oppose indiscriminate burning because it will not be successful in a great many areas; it will result in waste of money, and it will often be followed by accelerated erosion and runoff.[47]

The regional forester amplified this expression of policy in the prepared statement submitted to the subcommittee:

Managing brush-covered lands is a significantly different problem in northern and southern California. In northern California, topography, climate, and soil offer more opportunities to remove the brush and replace it with a plant cover of more direct economic value to grazing, wildlife, and timber interests. In southern California, conditions are less favorable for conversion to other cover, and watershed protection transcends all other values. In general, the mountain slopes have never supported anything but chaparral brush. With brush present, nature exercises reasonably good control over the mountains in preventing sources of flood and damaging debris. Without the brush, erosion and flood are rampant.

Possibly there is no other locale on the face of the earth where a large population is so directly dependent upon the vegetative mantle on its watersheds. The excessively steep mountains are so close to millions of people that uncontrolled runoff poses a constant threat. Conversely, the same closely situated watersheds are invaluable in furnishing water to meet local domestic, industrial, and agri-

[44] Ibid., p. 2.
[45] Ibid., p. 64.
[46] Ibid., p. 73.
[47] Ibid., p. 6.

cultural needs. Uncontrolled runoff on fire-denuded slopes not only results in quick, flash flows, but carries tremendous quantities of soil and boulders downstream.

Such terrific discharges of debris-laden water have taken many lives and destroyed vast amounts of property. To control these catastrophic floods, many dams and debris basins have been constructed. After the floods, these debris basins are cleared and the material is hauled away. The costs are extraordinarily heavy, often more than $3 per cubic yard, and then repeated after the next storm. One-half billion dollars has already been spent in Los Angeles County alone on downstream flood control. Another half billion dollars is still planned. Worse yet, the runoff water from these storms cannot be profitably impounded.

The question is often asked, Can southern California's brush be replaced with vegetation less flammable or in which fire could be more easily controlled? A search for plants that will meet these and other attributes is underway. Of the many plants tested six species show promise of being able to withstand both the long, dry summers and the poor, shallow soils of the southern California mountains.

Frequently proposals are made to "light burn" or "strip burn" southern California chaparral lands during the winter as a hazard-reduction measure. This practice does present possibilities but is much more complicated and expensive than commonly assumed. Usually chaparral in the south either won't burn at all or burns with such intensity that it is difficult to control. Thorough preparation is necessary to burn the brush and confine the fire to the area desired. This pretreatment includes firebreaks and smashing the brush with a tractor or spraying it with chemicals to increase flammability. The work is costly. If the fire does not burn hot enough to clean up the fuels the effort is a waste of time and money. If it burns hot enough to do the job it requires extraordinary measures to keep it under control. And then the soil exposed to winter rains must be revegetated to prevent excess runoff. Without these precautions the results are the same as from wildfire.[48]

State Forester F. H. Raymond, with responsibilities extending over a larger portion of the region than is included in the national forests, added support by the State of California to a policy of complete protection from fire:

Paramount in any consideration of wild lands in southern California are their values for water production and as watershed. Approximately 7.3 million acres of rugged mountainous terrain, upon which the dominant plant cover is brush, with limited tracts of timber intermingled, produce supplies of water essential to those who dwell in the valleys below. These watersheds produce a total of approximately 35 percent of all water used in southern California: the proportion produced locally in the various counties ranges from about 50 percent in Orange to 100 percent in Santa Barbara and Ventura Counties.

Water produced from these watersheds is extremely important to the local economy of the region because of its low cost compared with transported water and the season of year at which it is available. Because it is generally agreed that lack of water will be the limiting factor in the future development of this region, it is highly important that these local sources be protected and maintained in the highest possible state of production.

Paradoxically, these mountain watersheds also are sources of disastrous floods that may cause enormous destruction of property and even loss of life. Such floods are more serious where lands have been denuded of their plant cover. Removal of the vegetative cover by fire normally results in higher peak flows of stream runoff and increased rates of soil erosion. Because of its function in promoting infiltration and reducing surface runoff and erosion, maintaining a plant cover is of first importance on watersheds of southern California.[49]

(*a*) The policy of complete protection from fire or other denuding forces was supported by representatives of several of the southern California areas.

Arthur W. Walker, consultant to the State senate interim committee on forest practices, and chairman of the Tricounty Fire and Flood Prevention Association, with offices in San Bernardino, testified that—

[48] Ibid., p. 18, 19.
[49] Ibid., p. 29.

Ground cover is essential in the retardation of runoff water on our precipitous slopes which helps to control devastating floods and also in preserving a usable water supply. Storage dams in most canyons are economically unfeasible because the steep slopes do not permit the storage of economical quantities of water at anything approaching a practical cost. Control burning in southern California is hazardous and a substitute ground cover must be found to prevent erosion.[50]

Duncan A. Blackburn, chief engineer and general manager of the Pasadena Water Department, submitted, as part of the testimony of his assistant, Elmer L. Smith, a brief description of Pasadena's vital interest in the watershed centering around 815 acres of city-owned land in Arroyo Seco Canyon within the Angeles National Forest:

We would shudder to contemplate any type of control burning in its drainage area since we have experienced water losses in the past due to forest fires, particularly the Brown Mountain fire of 1933, as a result of which, the runoff from the rainfall carried quantities of ash, wood, and eroded soils into the area at the mouth of the canyon behind the Los Angeles County Flood Control District's Devils Gate Dam. The result was the deposition of layers of sand, ash, and other detritus.

The result of this deposition was the sealing off of much of the water-bearing gravels, thus cutting down the percolation in the area behind the dam. The water which did percolate passed through layers of ash and debris, causing decomposition of these materials and the resultant degradation of the waters in the underground basin in the immediate area to such an extent that two good water wells had to be abandoned.[51]

Robert T. Radford, chairman of the Los Angeles County Watershed Commission testified that—

Each time we burn over any portion of our watershed we are increasing the cost of our economic production, while at the same time we are silting up our flood-control dams and debris basins.

Responding to a question from Representative Sisk as to whether he was referring to water production, Mr. Radford, replied:

I am talking about all production in southern California. In other words, it is necessary to have water, and every time we lose our native water we increase the cost of the water to the consumer.

After a brief colloquy, he added:

I think all of you men are very familiar, of course, with the type of topography of our ground here and our mountains. So it is almost impossible. You cannot burn off because you get into the silting process.

We have just gone through a fire of about 2,500 acres in the San Gabriel Canyon, and it is estimated we are going to have at least 400,000 cubic yards of dirt either in the No. 1 dam or in the Morris Reservoir up there as a result of this fire. That is a tremendous economic loss. You lose not only the capacity of your dam—and if you want to keep that capacity, it is going to cost—I do not know—$5 or $6 a cubic yard to get it out. And then you have to find a place to put it.

So I know this: That all through southern California—and I have been there a long time—the cost of water is continually rising, and the cost of water will continue to rise with imported water.[52]

Lloyd P. Parratt, president of the Pomona Valley Audubon Society, responding to questions from the chairman, brought out the relation which burning bears to life in the soil and to wildlife:

Studies that have feen made by various institutions, including the California Institute of Technology, reveal there is no cover comparable in value to the brush which we ordinarily call chaparral, that it is the best medium for protection of mountain sides from erosion, encouragement of water percolation, and inhibition of floods which has yet been found.

[50] Ibid., p. 182.
[51] Ibid., p. 155.
[52] Ibid., p. 160.

Certainly I believe it would be agreed that floods have caused much more loss of life than have forest fires. I think it is very important that we have more respect for the chaparral, which is the native cover, which does fit in with the natural cycle of nature here.

Furthermore, I am a little bit frightened by the lack of appreciation for the fact that soil is a living dynamic thing, and that when you burn you destroy much of the life in that soil and the wildlife which is dependent upon that plant cover.

The CHAIRMAN. I asked about that the other day, and they said that all we destroyed was the permeability, that is, the penetrating quality. Does burning destroy something else?

Mr. PARRATT. It takes a good many years, as we have pointed out, for that vegetation to come back to its desirable condition again. Likewise, it takes a good many years for all of these other factors to come back—the associated wildlife, the associated organisms in the soil, and so on.[53]

A summary of the case for chaparral and brush was expressed by Emeritus Prof. A. W. Sampson of the School of Forestry, University of California.

Chaparral and sagebrush form a climax cover over limited areas in northern California but occupy a substantial part of the coastal region of southern California. Shrub-covered soils of the southern area that are of low suitability for grass production are more extensive than in the northland, the slopes are steeper, the vegetation is less dense, and the rainfall is more intense. Consequently, it is more difficult to control soil erosion and manage the watersheds for the greatest good of the people. Fire hazard is high in this brushy cover, and destructive wildfires occur every few years. The most important product of the mountain lands in southern California is water. But streamflow that is muddy becomes unusable and damaging. Burning is the principal cause of accelerated erosion and floods in the southern California brush areas.[54]

(*b*) Turning his attention then to persons who advocate periodic controlled burning as a means of reducing fuels and helping prevent destructive wildfires, Professor Sampson said:

Well-meaning persons have also proposed the replacement of brush with grass over large areas, through burning and reseeding, in order to reduce the volume of fuel to feed a fire and to decrease the moisture requirements over that of the chaparral. Studies to date indicate that the chaparral is generally the best adapted cover at present available for protecting the soil mantle. Although a grass cover may account for a somewhat larger carryover of soil moisture than brush below the 4-foot depth, such water accumulation would be confined to soils having a deep profile. In southern California a large proportion of the watershed soils are less than 18 inches in depth and therefore incapable of supporting more than a sparse cover of perennial grasses and/or forbs, but which do support a good protective cover of adapted shrubs.[55]

In response to a question by Congressman Rhodes as to the possibility of developing a fire-resistant type of brush, Professor Sampson expressed the view that this field should be explored and that it is a fertile field of research.[56]

J. Edgar Dick, secretary of the California Cattlemen's Association, presented the case for periodic controlled burning in a letter submitted for the record. His conclusion was that—

Controlled burning returns brush-covered lands to forage for livestock and wildlife. Experiments have shown that brush eradication conserves water. Controlled burning on private lands reduces fire hazards and destruction of natural resources.

Cattlemen feel that the Forest Service should initiate an aggressive brush clearance and reseeding program as quickly as possible to prevent further destruction of property and natural resources.[57]

[53] Ibid., p. 209.
[54] Ibid., p. 112.
[55] Ibid., p. 112.
[56] Ibid., p. 139.
[57] Ibid., p. 242.

Judge Acton M. Cleveland of Comptonville, supported his strong belief in periodic burning on the basis of observations made during a lifetime in Yuba County.

In my opinion the policy which has been put forth by the Forest Service since its inception is responsible for the condition of the forests and the fire situation as it exists today. The policy has been now for over 50 years, to permit no fires in the forests and to allow a jungle of underbrush, useless vegetation, and trash to accumulate in our forests during this period of time.

My opinion and this statement is formed from my personal observation of this condition for the past 50 years. Anyone knows that whatever premises one is in charge of, it must be cleaned up and taken care of. If one owns a lot or piece of property in a city and does not take proper care of it, and allows a fire hazard to become prevalent, the city will take care of it for the owner and make him pay the bill. Every property owner removes the fire hazard from his own lot, yard, or farm, or destruction would follow.

I have lived in the mountains within a heavy forest my entire lifetime. When I was a boy, I could walk freely throughout the forests in any direction just as though walking in a park. In those days the natives, and before them the Indians, kept the forests clean. Fifty years ago the Forest Service came into being and began their policy of not permitting any fire in the forests, letting the trash collect in our forests and today we have a veritable jungle, as a result, where one would walk freely, now a rabbit cannot crawl through.[58]

J. D. Slournoy wired from Bakersfield for the Cuyama Valley Sportsman's Club "in favor of control burning by Government agency."

Comburologist Ralph L. Fenner referred to the fire history of brush areas in southern California and testified on the basis of his personal observations that accumulated annual growth can create an "optimum or maximum conflagration potential" at intervals of 20 or 30 years. "Anything we can do to extend that rotation or reduce the damage from the fires," he concluded, "is worthy of consideration." To this, he added a special warning:

When you are dealing with the elfin forest of southern California any light burning will scorch the leaves and kill them, and you get a hopeless situation in terms of building up a greater conflagration potential than you reduce with light burning.[59]

Prof. H. H. Biswell of the School of Forestry, University of California, testified at length in support of the benefits derived from periodic controlled burning, but in response to the chairman's question, replied:

I have not experimented here in southern California. Most of my experience has been in Chamise brushland in Lake County and in woodland grass brush areas in the foothills of Madera County. But I certainly think that controlled burning, as I mentioned in my report, should be tested as one means of reducing fire hazards, reducing the fuel, and I propose there a study and a test of rotation burning based on about a 20-year rotation.

The CHAIRMAN. But you make it very clear that you have not had any experience in that type of burning in this particular type of watershed, and that question is significant in view of the testimony this morning.

Now prescribed burning, the type indicated in these magazine articles that were attached to your statement, and which are very revealing: I would assume in appropriate cases you favor prescribed burning for the purpose of reducing the fuel content of the forest. Is that right? [60]

One problem related to control burning was raised by Mr. Haley when he asked this question:

"Is an individual man in the Forest Service, if he sets a fire to destroy a fire, personally liable for damage?"

[58] Ibid., p. 239.
[59] Ibid., p. 176.
[60] Ibid., p. 122.

Mr. Brelsford replied as follows:

Now I attempted to quickly check out the law on the liability of the Federal employees for negligence in their fire fighting, and I have found no ready reference to any liability. However, in municipalities, which, of course, are exempt from any liability, individual firemen are liable for their negligent acts in fighting fires. And there is now a belief throughout the Forest Service that they personally can be sued if they are negligent or issue orders negligently for fighting fire. * * * We feel that no program of controlled burning will be effective if the individual has to worry about his liability, because they are so worried now when they fight fires that they often do not even set off backfires. Then if you go out and deliberately set a fire, which is what you are doing with controlled burn, the liability is pretty well established as to the ordinary individual, that they are liable.

I think that would be such a deterrent on these employees that you could get very little effective controlled burning done without such exemption.[61]

The terrible speed and intensity attained by fire in the southern California mountains is described in the official report of the Inaja forest fire, started by a curious Indian boy with a single match in dry grass on the Cleveland National Forest in November 1956. The report is included on pages 8 through 14 of the hearing record.

Scarcely 8 hours after a Forest Service lookout warned of the first smoke on the morning of November 24, 25,000 acres of brush and forest had been burned. A little more than 24 hours later the fire appeared to be under control. So, taking advantage of the night "when winds subside and burning conditions are less hazardous," a 13-man trail-building crew under an experienced boss started to help hold back the fire as it burned out. After climbing up the canyon to check on the burning-out work the boss noticed that the main fire was unexpectedly flaring up on a side-ridge more than 1,000 feet below the men.

The events that followed are described in the report as follows:

Suddenly it made a short run toward the main ridge where the men were building trail. He called a warning and told them to come out.

The men stopped work and all started back up the trail at normal pace. This was at about 7:45 p. m. The men farthest down the hill had approximately 1,100 feet to travel up the trail. Survivors reported that there was no panic. Some of the men wondered why they were being called out. Most of them kept their tools. One even picked up a shovel and canteen abandoned by another.

The fire below suddenly gathered momentum and the crew boss on the top of the small bluff saw that it was now a real threat to the men below. This happened about 2 minutes after the first warning, and he again yelled to the men, telling them to hurry up. Most of the men now dropped their tools and began to go faster.

Two of the men stationed on the upper part of the line escaped before the fire reached the rim. Two others, who also had been working on the upper part of the line, stopped at a small open spot just below the rock bluff on the cleared line. Others pressed on up to them from below. Within a minute or two, 5 men who had been working lower on the line reached the 2 men waiting in the open spot. They were slightly ahead of the remaining nine men. By this time, the fire had outrun them to the right and had crossed the cleared trail above. These 5 men turned off to the left, climbed and struggled up the 15-foot rock bluff, and raced the remaining 75 feet to safety at 8:05 p. m. They reported later that, on this last stretch, the fire was only 10 feet behind them.

The 11 victims were cut off while still below the small bluff, presumably by an instantaneous "flashover" of a large area of fire. This sudden expansion of the fire front was testified to by the survivors and other nearby observers. In addition, two fire bosses on the opposite side of the main San Diego Canyon observed the action of the fire when it made its fatal run. They reported that it ran up the ravine beside the ridge where the men were working and across the fire trail near the top. At about the time the fire got to the rim, there was a sudden "flashover" to the left, which the observers said simultaneously ignited a large area, perhaps 40 acres. This explosive "flashover" enveloped the 11

[61] Ibid., p. 130.

victims just below the small bluff. It apparently was caused by ignition of gases forced up the ravine by the extremely rapid run of the fire.

All victims were found in an area with a radius of 45 feet, and the lowermost one was only 300 feet from the tractor-built line at the top of the Canyon rim. The fire barely crossed this line in only a few places, where it was quickly put out. Of the men that escaped, two had been working at the very lowest part of the trail. Two who had been working closest to the rim did not escape.

* * * * * * *

Before being controlled at 6 p. m., Wednesday, November 28, the fire burned 43,611 acres within the Cleveland National Forest and adjoining land protected by the State. The area burned had a 90-mile perimeter. At least five homes were destroyed. More than 2,000 men fought the fire, 1,300 under Forest Service supervision. These included 500 Indians (local and southwestern region), about 500 Navy personnel, 200 inmates from San Diego County and State honor camps, and other organized crews. These men, plus 3 helicopters, 4 air tanker planes, 2 scouting planes, 27 bulldozers, and a fleet of 90 stake, tank, and pickup trucks, formed one of the greatest arrays of men and equipment ever assembled to fight a forest fire in San Diego County.[62]

(*c*) State Forester F. H. Raymond summarized his experience with efforts to remove the fuel hazard in southern California by controlled fires:

The area of greatest threat to life and property from the fuel hazard is on the precipitous watershed slopes. Even though the existing watershed cover creates a hazard, there is still a greater hazard when the slopes are burned. When these slopes are denuded by fire, valuable areas below are exposed to severe damage from accelerated erosion and flood flows. The standard tool of fighting fire with fire by denuding vast areas is thus generally impractical. Even in the physical control of a going fire the use of this tool is often ineffective, as the fire often burns with such intensity that it can only be compared with an actual explosion. This condition has been accentuated by several years of subnormal rainfall resulting in abnormal amounts of dead brush. To use fire as a tool at times of the year when it is safe to use fire in many other parts of the Nation is very difficult, as fire is unpredictable with our present knowledge because of the desert winds and rugged terrain. When it is safe to burn the brush, it will not burn; when it is burnable, it cannot always be controlled.[63]

Director Dewitt Nelson, of the California Department of Natural Resources, left no question as to his opinion of lightburning—

You cannot lightburn in this country. A fire either burns rapidly and practically explodes or it will not burn at all. There is no middle ground in burning down here.[64]

Earl Roberts, cochairman of the Citizens Forestry Study Group of San Diego County, added evidence from nonprofessional men and women with vital interests in the community:

Our group has learned the worth of an unburned, valuable watershed in supplying water for domestic, industrial, agricultural, and recreational uses for a county whose coastal region is desertlike and in the need of water, and whose population has increased an average of 75 percent every decade since 1900. We have learned that denuded watersheds waste our mountain soils, clog our streams, fill our costly reservoirs with debris, and threaten our farms and communities with flood and erosion.[65]

E. Domingo Hardison, a member of the State board of forestry, testified that—

Once the cover is destroyed by fire, erosion sets in, and the succeeding cover is less dense and vigorous than the original. One more fire and the snowball of watershed destruction is on the way.

[62] Ibid., p. 12.
[63] Ibid., p. 24.
[64] Ibid., p. 67.
[65] Ibid., p. 215.

The soil being bare, these methods of erosion become active: (1) Erosion by water; (2) erosion by wind; and (3) erosion by gravity. Water and gravity take silt and debris downstream, clogging stream channels and silting reservoirs.[66]

Edward N. Munns, now retired from research administration in the Forest Service, added his testimony as follows:

Fire-hazard reduction should be an inseparable part of fire control in southern California. So far, practically nothing has been done anywhere. In this chaparral region, research is essential to determine what can be done, and how best to do it.

Hazard reduction can take several forms: One is fireproofing the combustible material with chemicals to make fuels less flammable. Another is the breaking up of extensive areas of hazardous material into smaller units. Another would be through reducing the amount of fuel on the ground and that annually produced. A combination of such measures may be feasible.

Research is needed to determine the method and its effectiveness, especially under the various local circumstances of climate, terrain, and cover. The value of the adopted measures would appear in reduced fire danger or in the rate at which fires burn. Findings might determine reappraisal of the entire organizational setup for fire control.

Legislation is not needed, as authority for such work is carried in the Forest Research Act of 1928. Appropriations only are required; these should be of about the magnitude of $300,000 annually for a period of about 10 years.

Cooperation of all fire-control agencies and political subdivisions in southern California dealing with the problem should be invited. Indeed, these units might well show their interest by financing a third of the cost.[67]

5. Newer types of equipment are needed and experimentation with new tools, plant materials, and techniques must be continued

The committee chairman made plain from the outset that the gathering of information on suppression and control of forest and brush fire is a major need and one of the objects of this hearing. When opening the hearing he said:

I have called this hearing to learn why southern California is plagued by so many fires and why many of them get to be so large. We noticed, in instances coming in, vast areas have already been burned over to the east of Los Angeles. One fire, I understand, took a million dollars to control.

I want to be able to assure the people in this area that every possible means is being used to keep forest and brush fires from starting and destroying so much of of your valuable local watersheds.[68]

(a) *Operation Firestop:*

The regional forester stated:

The Forest Service, through its research organization, has responsibility for all Federal forest-fire research. * * * Many of the important techniques and equipment now commonly used in fire suppression were pioneered by the Forest Service for its own use and for other agencies. Some of these include tractor plows for fire-line construction, powered brush cutters, powered fire-line trenchers, techniques for lighting fire from the air, portable two-way voice radios, special fire pumpers, lightweight hose, and evaluation of fire danger through measurement of a combination of climatic and other factors. The Forest Service smokejumper corps was a forerunner of the Army paratroopers.

One of the more profitable research projects was the study known as Operation Firestop, conducted in southern California. Industry, city, county, State, Defense Department, and other Federal agencies combined forces in 1954 to concentrate research and development effort on new methods of forest-fire control. The total value of their contributed effort was one-half million dollars. Firestop developed the technique of bombing fires with chemicals dropped, uncontained, from airplanes. It tested several ways to use helicopters as fire-fighting tools. It conducted special studies of fire weather and fire behavior. All of these approaches advanced our knowledge.

[66] Ibid., p. 196, 197.
[67] Ibid., p. 245.
[68] Ibid., p. 2.

During 1956, several of the developments started during Operation Firestop became practical fire-fighting measures. Air tankers joined ground fire-fighting forces on 25 fires by dropping 1,350 loads of water and chemical. Ground tankers made chemical attack on 23 fires. Hose-lay trays, now in regular production, were used to lay hose by helicopter on two fires. In the current year these modern fire-attack methods have been used on more fires and to a greater extent. Cooperative study projects between research groups and fire fighters continue at a scale unknown in the past.[69]

Transland Co. described Operation Firestop as—

an operational study designed to explore certain aspects of mass fire buildup and behavior, and to provide the fire services with some new aids to mass fire prevention and control. Actual demonstrations of chemical applications by air were conducted. The tactical possibilities of helicopters were explored, and methods were developed to transport men and fire pumps with water to fire in rugged terrain.[70]

State Forester Raymond described it as—

a program of complete cooperation between all concerned agencies of government and industry, a cooperative program that has advanced fire-control methods and techniques many years. The United States Forest Service has been a very important part of this program, to find the answers to the watershed fire problem. Nowhere else in the Nation do you find the encouragement and support of the citizen in the giving of his free time to this problem, and nowhere else do you find such cooperation and pooling of resources by all agencies in combating this fire menace.[71]

Not least important among the achievements of Operation Firestop was to demonstrate that the present fire research efforts of the Forest Service fall short of being able to keep the responsible administrative and protective officers abreast of modern technological and scientific development.

(*b*) The instantaneous "flashover" in the Inaja fire during the evening of November 25, 1956, when 11 men lost their lives, evidences the critical need for more research on fire behavior. Apparently this—

was caused by a critical combination of highly flammable fuels, steep topography, and adverse weather. The lull in the fire before and at the time of arrival of the night crews created a false sense of security, even though existing conditions of fuel, topography, and weather were critical.[72]

Similar erratic behavior during other southern California fires has caused tragic losses. For example, in 1933 within Griffith Park in the city of Los Angeles, 28 fire fighters lost their lives by burning and an additional 128 were treated for injuries. In 1943, 10 military personnel lost their lives in a fire in the Cleveland National Forest; in 1955 a captain of the Los Angeles County Fire Department and four fire fighters lost their lives in a wild-land fire.

Emeritus Professor Sampson spoke of the same need and stressed that—

The funds now provided for basic research are but a fraction of 1 percent of the total expended in fighting disastrous fires. Yet only through research can these expenditures be significantly lowered. Adequate funds should be provided without delay.

Federal forest fire research is part of the forest research program authorized by the McNary-McSweeney Forest Research Act of 1928 (45 Stat. 669). Keith Arnold, director of the California Forest and Range Experiment Station of the United States Forest Service,

[69] Ibid., p. 15.
[70] Ibid., p. 263.
[71] Ibid., p. 23.
[72] Ibid., p. 12.

testified that the current appropriation for forest fire research is "in the order of about $450,000." Of this amount about $170,000 is available to the California Forest and Range Experiment Station.

Mr. Arnold testified that beginning in July 1957, the California Division of Forestry has a fire research budget of $50,000, of which all but six or seven thousand dollars has gone into cooperative programs with the Forest Service, involving fire prevention, both man-caused and lightning; the development of aircraft and chemicals; weather studies; and fire danger rating studies.

The need for information on which to perfect fire-fighting techniques for California conditions has given rise to a fire research council under the general offices of the State forester. The council includes all of the fire-fighting services, the United States Weather Bureau, and private industry.

Mr. Arnold reported that the council has indicated several major projects are not adequately covered in the present research program. These deal with reducing the fire hazard of fuels, various aspects of the economics of fire control, an operations analysis of fire-fighting methods, and increased activity in fire weather and fire procedure.[73]

(*c*) Edward N. Munns presented the need of conducting several phases of forest research simultaneously. These would include types of equipment, organization and practices, and factors entering into combustion, "as well as factors responsible for the rate of spread of fire and for fire behavior."

Reminding the subcommittee that authority for all work now being conducted is carried in the Forest Research Act of 1928, Mr. Munns proposed that "local and private agencies should cooperate in the studies and share in the cost." [74]

This proposal is in line with recent action by the State of California to provide $50,000 for forest fire research, and to allow the bulk of it to be expended cooperatively with the California Forest and Range Experiment Station as conducted by the U. S. Forest Service.

State Forester Raymond testified to the need of—

"additions to and improvements of present fire-control techniques."

The division of forestry has, for many years, maintained a force of equipment engineers. These men, teaming with experienced field personnel, have designed increasingly efficient fire trucks, tiltbed transports, and trailers, and specialized equipment such as backfire hose-lay trailers, fire plows, hydraulic and electric dozer blade controls, electric powered slip-on fire pumps, mobile field kitchens, silver iodide generators, tanks for use in aerial water and chemical drops, canvas slip-on tanks and pumps for auxiliary use on dump trucks and transports, etc. Much of this equipment has been designed for use in specific problem areas. For instance, because of topographic and vegetative differences, six basic designs have been developed for fire trucks needed throughout the State.[75]

Of seven areas of research detailed by Mr. Raymond the following applies particularly to southern California:

Hazard reduction in southern California: district VI, of the Division of Forestry has, for some time, been heavily engaged in a program entitled "Operation Prefire Control." This operation is intended to develop fire or fuel-breaks, roads, heliports, water developments, etc., to facilitate fire-control operations. The fuel-breaks are barriers which will provide access to fires and aid in stopping major conflagrations moving rapidly through the brush-fuel types of southern California. This program is now being coordinated with "Operation Fuel-break" of California Forest and Range Experiment Station to further facilitate the reduction of the extreme fire hazards created by large expanses of brushland will

[73] Ibid., p. 72.
[74] Ibid., p. 242-247.
[75] Ibid., p. 35.

involve hand and mechanical treatment, chemical spraying, ecological and genetic studies, substitution of species, etc.[76]

Director Dewitt Nelson added the hope that—

through chemical treatment, possibly we can treat firebreaks or critical areas, and maybe in the long run, where it gets cheap enough, large areas, say, following a fire where the heavy cover has been lost, to treat the sprouting material chemically so we will reduce the density and possibly also reduce the high growth of that brush, and still maintain a cover that will contribute some trash to the ground to hold it in place and help filter the water into the soil. By that method we hope we will find some benefit that will reduce the critical fire hazards that confront us here in the south.[77]

6. Areas of residential concentration need to be excluded from within the national forests

Administration and protection of the national forests in southern California are complicated by the rapid expansion of population which has encouraged acquisition for residential purposes of almost every piece of available land within and adjacent national forest boundaries. As noted by Chairman Engle—

people have moved right out into these forest areas, and when these forest fires start not only the forest resources but the homes and even communities are menaced.[78]

Los Angeles County forester and fire warden K. E. Klinger testified that—

Los Angeles is the third largest population center in the United States. Excluding county area on Catalina and San Clemente Islands, the mainland area is 3,951 square miles encompassing 60 incorporated cities, numerous large county unincorporated communities, and large areas of wildlands. This figure includes 1,079 square miles in the Angeles National Forest or approximately 27 percent of the county, of which 96 percent is federally owned with the remaining 4 percent privately owned lands within the boundaries of the Angeles National Forest.

The population of Los Angeles County as of July 1, 1957, was 5,507,429 with an assessed valuation of $9,846,084,700. Approximately 5,426,324 people, or 98 percent of the entire population, are compressed into 880 square miles or about 20 percent of the entire mainland area. This population is in the main adjacent to but south of the Angeles National Forest and is located principally in the Los Angeles coastal basin, San Fernando, and the San Gabriel Valleys. Conservative estimates show a yearly increase of 200,000 people over the past 7 years with a forecast of 9 million people by 1975 for Los Angeles County. This is a phenomenal growth which has strained and is now diminishing the natural resources, principally water, of the county both within the Angeles National Forest and areas outside.[79]

Chief T. William Heidner of the Pasadena Fire Department testified that—

Pasadena has several boundaries that are integral with the Forest Service. In fact, part of the city of Pasadena is well within the Federal Forest Service in the San Bernardino Mountains.[80]

Carl N. Hewitt, a resident for more than 42 years within the San Bernardino National Forest testified that during periods of high winds—

we can neither protect nor evacuate the permanent residents and vacation occupants of some 12,000 cabins and palatial homes in the Crestline-Lake Arrowhead areas alone.[81]

[76] Ibid., p. 35.
[77] Ibid., p. 66.
[78] Ibid., p. 2.
[79] Ibid., p. 46.
[80] Ibid., p. 140.
[81] Ibid., p. 248.

The following table shows the percentage of land not in Federal ownership, most of which is privately owned, within the exterior boundaries of each national forest in the area:

National forest	Gross area within the exterior boundaries (acres)	Other lands within the exterior boundaries (acres)	Percentage of other lands within exterior boundaries (nearest digit)
Angeles	691,052	42,778	6
Cleveland	567,103	174,792	31
Los Padres	2,007,025	237,889	12
San Bernardino	812,633	197,770	24

Source: Forest Service, USDA, National Forest Areas, June 30, 1956, p. 3.

7. More liberal authorization needed for postfire emergency treatments on denuded watersheds

(*a*) The Flood Control Act of May 17, 1950, section 216 (64 Stat. 184; 33 U. S. C. 701b–1), authorizes the Secretary of Agriculture—

in his discretion to undertake such emergency measures for runoff retardation and soil-erosion prevention as may be needed to safeguard lives and property from floods and the products of erosion on any watershed whenever fire or any other natural element or force has caused a sudden impairment of that watershed.

Emergency treatments can be applied on land in any ownership but Federal expenditures are limited to $300,000 in each fiscal year.

The regional forester testified that—

The immediate problem after major fires are controlled, is to get vegetative cover on the ground in order to reduce the high hazard from floods and erosion. The increase in flood peaks and erosion rates following fires emphasizes this need.

In the past 5 years, emergency treatment has been carried out on 28 watersheds in the United States, and all but one was following fire. Twenty-one of these watersheds were in southern California. Treatments included 175,000 acres of seeding, 14 emergency debris basins, and 50 miles of channel clearing. Federal expenditure totaled over $700,000 and State and local participation more than $500,000.[82]

The maximum Federal expenditure for any year was approximately $250,000 in 1953.

No statement was made as to whether the Flood Control Act of 1950 might have been used for more emergency treatments, or whether lack of special threats to life or property required the use of regularly appropriated funds as they became available.

Col. H. E. Hedger, Los Angeles County Flood Control District chief engineer, testified:

The phase of fire prevention in our watersheds that concerns our district is the aftereffect upon the runoff of strong waters. We have found, both by experience and by research, that once the brush cover, the natural cover of our watersheds in this country, is destroyed by fire or otherwise that there are serious consequences both in the production of debris from those watersheds and in the increased run of water from the watersheds.

The first effect is that of erosion from the denuded watersheds that occurs in the increased erosion by sheet runoff of the rain falling on the hillsides, the increased runoff by slippage by hillsides caused by more water running in the channels that accumulates from the hillside runoff.

* * * * * * *

In addition, there always follows an increase in the rate of sump water runoff. The water, of course, is bulked by the mud and debris that is added to it, and by the ash, timbers, and other materials that come from the hillsides. And the result is that from these canyons that have been burned over during a major flood you

[82] Ibid., p. 18.

will find a discharge of floodwaters and debris that issues just like the blast of a shotgun. It comes with tremendous force and is fired at the residences, homes, the people that reside close to or below the mouth of these canyons.[83]

Colonel Hedger then spoke concerning the unusually heavy rains, and the climate of the area:

It is going to be more important as the years go by. When you consider that Los Angeles County, which lies along the edge of the ocean, * * * is directly in the path of some of the heaviest moisture-laden air masses that move in this direction, we are suckers for such conditions. When those air masses move down * * * along the coast they are pointed right straight at this town. When they do get here they find this backdrop of mountains that reaches an elevation of 10,000 feet within 40 miles of the coast. As a result, it is practically instant condensation of the moisture in those air masses. So we have what we call cloud bursts. When we get a major storm that hits this area the result is rainfall that reaches tremendous amounts.

For instance, I think your committee will be interested in knowing—I believe it was in 1943—rainfall was experienced up in our mountain watersheds within 30 miles of here to the extent of 26 inches in a 24-hour period. One of the world's records for rainfall intensity.

When you realize conditions like that can be imposed on an area that is now occupied by over 5 million people, the immensity of this hazard is obvious, and the necessity for doing everything in the way of fire protection, fire prevention, flood control, and every phase of operation to reduce that hazard is of utmost importance.[84]

This description of hazards to life and property was amplified as follows in Colonel Hedger's prepared testimony:

During the major storm of March 1938 debris production from small watersheds burned over in 1933 above La Crescenta and in 1934 above Altadena reached rates of 124,000 and 119,000 cubic yards per square mile, respectively. These were watersheds of less than 0.3 square mile in area. As in many of the smaller watersheds in Los Angeles County, the debris problem, when these watersheds were covered with vegetation, was of minor importance. During two minor storms in January 1954 debris production from Bailey, Little Santa Anita and Big Santa Anita Canyons, which were almost completely denuded by the Monrovia Peak fire in December 1953, amounted to approximately 62,000, 31,000, and 28,000 cubic yards per square mile of burned area, respectively, or, in terms of volume, 32,000, 73,000, and 296,000 cubic yards, respectively. In comparison, Hastings Canyon and Pasadena Glen, small canyons immediately west of Bailey Canyon, but not burned over, produced only a negligible amount of runoff and debris.[85]

(*b*) Seeding with grass or other quick growing vegetation proves an effective emergency measure, but does not provide a permanent cover for most of the southern California watersheds. Emeritus Professor A. W. Sampson of the School of Forestry, University of California, testified that—

grass cannot be maintained on the more inferior brushland sites by presently known methods of management. As a general guide, the soil should average no less than about 18 inches in depth, and the more severely exposed shallow soils on south and west slopes in the low rainfall areas should be left undisturbed. A large proportion of the brush fields of southern California occupy soils less than a foot in depth and are therefore incapable of being measurably improved for grazing by planting grass.[86]

Earlier, during a discussion of research needs, he proposed that efforts be made to replace the more flammable brush type with vegetation that is not so flammable. To this point, he said: "We can perhaps find brush species that are hardy, that are aggressive, that could replace our present brush cover." [87]

[83] Ibid., p. 49.
[84] Ibid., p. 51.
[85] Ibid., p. 52.
[86] Ibid., p. 108.
[87] Ibid., p. 103.

(*c*) The Los Angeles County Flood Control District is spending large sums of money for flood control and hazard reduction, as well as for prevention and control of fire. Similar work is being carried on by the San Bernardino County Flood Control District. M. A. Nicholas, chief engineer of the latter described the relationship between fire prevention and flood control in watershed protection as "inseparable," and testified that the counties of San Bernardino, Riverside, and Orange have a mutual agreement to consider and take action on all fire, flood and other drainage-basin problems.

From 1953 to 1956, 79 square miles of valuable watershed and recreational areas in these counties were burned from the front slopes of the San Bernardino National Forest. Included are 5 watersheds on which fires devasted nearly 11 square miles, or 47 percent of the area.[88]

To meet emergency situations arising from such extensive denudations, Mr. Nicholas reported that San Bernardino County has financed a bond issue of $3,425,000 as its share of constructions now being undertaken by the United States Corps of Engineers at a total estimated cost of $17,258,000. When completed, these works promise a high degree of protection from watersheds previously destroyed by burns.[89]

Mr. Nicholas concluded by stating that—

> the San Bernardino County Flood Control District in order to meet the burdens thrust upon it by past fires has increased its tax levee to the legal limit and assumed bonded indebtedness for the next 25 years. Continued reoccurrence of the magnification of flood hazard threats places unprecedented burdens upon the district.[90]

8. Need for more active use of Armed Forces trainees on national forests

(*a*) F. R. Jewett, Ventura County representative on the Southern California Watershed Fire Council and chairman of the council's committee on military equipment and manpower spoke in behalf of more active use of Armed Forces trainees for construction of roads, firebreaks and other improvements on national forests. Basis for this proposal is the program now underway by some 40 Seabees from the Construction Battalion Center, Port Hueneme, Calif., in the Los Padres National Forest. Their early program of excavating on one day and filling the hole the following day was described as largely replaced with one of constructing roads and firebreaks designed in accordance with fire prevention and suppression plans for adjacent national forest areas. The program has contributed substantially to the presuppression facilities of that area and is submitted as evidence of the mutual benefits to be derived.

Portions of Mr. Jewett's prepared statement on the use of such trainees, follows:

> Prepared by Watershed Fire Council of Southern California; Los Angeles County Watershed Commission; Tricounty Fire and Flood Prevention Association, San Bernardino, Riverside, and Orange Counties; San Diego County Citizens Forestry Study Group; Los Padres Citizens Group; Santa Barbara, Ventura, and San Luis Obispo Counties; Military Equipment and Manpower Committee, F. R. Jewett, chairman, Ventura.
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> The Defense Department in its Armed Forces training program is developing skills in the trainee to enable him to meet any emergency. The advanced training of these trainees may well be developed while learning within the national forest

[88] Ibid., p. 192.
[89] Ibid., p. 194.
[90] Ibid., p. 194.

areas. More specifically, the engineers and heavy mechanized equipment operators, could produce substantial contributions in firebreaks, roads, and improved water supplies, while developing the necessary skills and thus augment the prevention phase of the United States Forest Service program.

The wildlands of the national forests provide unlimited areas of different terrain types and cover. A training program of the Armed Forces, integrated with the prevention plans of the Forest Service would provide maximum benefits to each department of our National Government. Specific projects, as outlined by the Forest Service, could be considered as military problems or maneuvers, and a task force of military personnel, employing officers, engineers, equipment operators, transportation and supply, in their solution or execution. The development of additional recreational areas, now overtaxed by the great increase in public use might serve as training opportunities for some other specific phases of the training program.

Fire suppression oftentimes requires the maximum use of all available men and equipment. The Armed Forces have never failed to respond when called, and have contributed invaluable assistance. There can be no economizing in fire suppression. Prevention, on the other hand, can through coordinating the plans of the Forest Service and a training program, utilize the most ideal conditions to accomplish both good land use management and ideal training objectives.

* * * * * * *

The Port Hueneme Construction Battalion of the United States Navy have in their advanced training program within the Los Padres National Forest provided evidence of the mutual benefits to be derived by such a plan.

Public support can be warranted by the productive "training while learning" of the Armed Forces trainees, and the skills so acquired will make the trainee even more acceptable to civilian employment when his Armed Forces service is completed. * * * The Forest Service program would be supplemented with this military activity and still not result in an increase in Defense Department training expenditures.[91]

(*b*) The results of such a program are reminders of the trails, firebreaks, recreational areas, check dams and other structures built under direction of Civilian Conservation Corps forestry engineers during 1932 to 1935.

Burton W. Bogardus, president of the Santa Anita Canyon Permittees' Association described these accomplishments as follows:

In the rugged terrain of many areas in Angeles, fire fighting is practically impossible; the entire program, therefore, is intimately related to a year-around prevention program. But this is not solely the responsibility of the Forest Service; it lies in the policy of the Government as a whole and the attitude of the people toward the forest. Although the admitted objective of the alphabetical agencies of the depression was to provide jobs, the work done by the Civilian Conservation Corps in the forest 20 years ago is still apparent in many localities, and remains as a reminder of the most effective program of fire prevention and conservation ever undertaken by our Government. And the trails, firebreaks, recreational areas and check dams built by these boys under the direction of forestry engineers were not the only beneficial results of this agency. Our young men put into uniform today and sent to some 70 foreign countries are thoroughly indoctrinated with information on what they are fighting against; but the boys in the CCC knew firsthand a vital part of the American heritage that is worth fighting for. Why cannot such an agency again be established? Could not those ineligible for military duties still perform aluable national service in the forest? [92]

[91] Ibid., pp. 199, 200.
[92] Ibid., p. 203.